the time. Not since 1912, when the off-shore winds of June and July were 26 per cent more than the average, has there been even as much as 10 per cent more than the usual frequency of off-shore winds in June and July combined. In June and July, 1919, the on-shore winds, NE., E., SE., and S., were 26 per cent more than the average frequency.

In view of the very unusual frequency and preponderance of off-shore winds on the New Jersey coast during the past two months, it seems reasonable to ascribe the reported coldness of the water to their action in blowing the warm water out to sea.

Addendum (Aug. 13).—A letter recently received from Mr. W. H. Culliman, of the Boston Globe, states that "The temperature of the water at New England beaches [Massachusetts particularly] has been consistently about 10 degrees below normal this season, according to reports from the State bathhouses." As in the case of the New Jersey coast, though to a greater degree in New England, the water probably has been colder than normal since the cold weather of last winter. Add to this the effect of a reduced amount of warming in June, owing to 25 per cent more than normal cloudiness at Boston (19 per cent excess at Nantucket), and we have the cold water partly explained.

The unusually persistent offshore winds (i. e., SW. to N.) have blown even the moderately warmed surface water out to sea and cold water has welled up from below to take its place. Wind data for Boston and Nantucket, tabulated with the help of Mr. Herbert Lyman, show that in June and July this year there was 10 per cent more offshore wind than in the corresponding period of last year. At Boston 74 per cent of all the wind in these two months was offshore (69 per cent last year), and in July alone 83 per cent—6,081 miles of wind went out to sea and only 1,248 miles came in.

Thus, cold water in spring, warmed moderately in early summer and then largely blown out to sea, has left for bathers the still colder ocean water creeping up from the depths of the Labrador current.

NOTES, ABSTRACTS, AND REVIEWS.

THE BLUE SKY AND THE OPTICAL PROPERTIES OF AIR.

By the Right Hon. LORD RAYLEIGH.

(*Abstracted from Nature, vol. 105, pp. 584–588, July 8, 1920.*)

The late Lord Rayleigh, from his demonstration that upon the basis of either the elastic-solid or the electromagnetic theory a cloud of small particles (individually minute relative to the wave-length) is capable of scattering incident light in every direction, the scattered light being preponderately blue and completely polarized in a direction at right angles to the source, was led to the conclusion that the air molecules alone were capable of accounting for much, if not all, of the blue light of the sky. Tyndall's experiments upon the disappearance of the path of a beam of light when the motes were removed by filtering through packed cotton-wool or by being consumed in the flame of a Bunsen burner under the beam seemed to refute this. The present Lord Rayleigh, however, has shown, by visual, photographic, and spectroscopic observations, that the path of a beam through dust-free air (and there is no trouble about removing all the dust—dust so fine as to be very difficult of filtration is an armchair conception not encountered in practical experimenting), when *observed transversely against* a sufficiently black background (e. g., the mouth of a deep cave) to get rid of stray light, is distinctly visible, and blue. It seems to appear to be of other colors, e. g., lavender, to some people because, probably, of a peculiarity of color vision with faint light.

Observation has, however, detected for each gas a characteristic departure (4 per cent for pure air) of the scattered light from complete polarization. Theory shows that this must be due to nonsphericity of the molecules; hence such experiments may furnish material for the investigation of molecular and atomic structure.

Rayleigh and Babcock have found, by means of the Savart polariscope, that the light from the night sky shows only a trace of polarization, and hence can not be due to light from an attenuated atmosphere so high as to be outside the earth's shadow.[1]

In 1917, Rayleigh (then Prof. Strutt) and Fowler discovered that the limited extension of the solar spectrum into the ultra-violet was due to absorption bands (previously undetected because of their diffuseness and the superposition of numerous metallic lines) identical with those observed at the limit of the spectrum of Sirius by Huggins in 1890, and identical with bands in the spectrum of burning magnesium when observed through a tube containing ozone. The solar spectrum has a greater extension in the ultra-violet with a high sun than with a low sun. Of oxygen, nitrogen, carbon dioxide, water vapor and argon, none appreciably absorbs ultra-violet rays in the region where the solar spectrum ends; and the spectrum of a mercury-vapor lamp observed 4 miles away, so that the air mass was equal to that above the Peak of Teneriffe where solar spectrum observations have been made, showed no evidence whatever of ozone absorption.

"What conclusion can we draw? Evidently that the absorbent layer of ozone in the air is high up, and that there is little or none near the ground. It may seem at first sight that this thin and inaccessible layer of ozone, which we have learned of by a chain of reasoning not less conclusive than direct observation, is a matter of little importance to man and his welfare. There could be no greater mistake. It acts as a screen to protect us from the ultra-violet rays of the sun, which without such a protection would probably be fatal to our eyesight: At least if one may judge from the painful results of even a short exposure to such rays, which those who have experienced it are not likely to forget."—*E. W. W.*[2]

[1] See H. D. Babcock, Note on the polarization of the north sky, Astrophys. Jour., 50, 228–231, 1919.—*E. W. W.*

THE LIGHT FROM THE SKY.

The color of the cloudless sky, though generally blue, may, according to circumstances, be anything within the range of the spectrum. The early attempts to account for the blue of the sky were mere speculations; the first logical attempt was that of Newton, but it was erroneous, and criticized by others.[1] The discoveries of

[2] It may be pointed out that if the absorptive layer of ozone did not exist, the course of organic evolution during the geologic ages would have been such that the resulting organisms whould have been adapted to withstand the ultra-violet radiations.—*E. W. Woolard.*

[1] See W. J. Humphreys, Optics of the Air, Jour. Frank. Inst., November, 1919, p. 657 et seq.